# UNITED STATES PATENT APPLICATION

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# MULTI-MODE MESSAGE
# ROUTING AND MANAGEMENT

# FIELD OF THE INVENTION

The present invention relates to communication services, and in particular to delivery of messages to selected recipients through one or more specified communication modes.

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# BACKGROUND OF THE INVENTION

Thanks to improvements in technology and widespread consumer interest, once-exotic forms of communication have become commonplace, and today the average consumer has access to a broad array of

10  communications services.  The Internet and wireless telephony, once the preserve of an elite few, now routinely supplement traditional telephone services and are frequently supplied by the same carriers.  Even inexpensive home computers now include facsimile capability.  Businesses employing mobile employees can furnish them with economical pagers that incorporate

15  advanced features, such as text transmission and Internet access.

The sheer proliferation of communication options, while greatly improving access and convenience, has engendered problems as well.  The existence of a communication channel does not ensure that the recipient of a message will be "listening" to that particular channel at a given time, yet the

20  sender of a message has no way to know this.  Indeed, more channels of

communication traffic mean more demands on the attentions of potential recipients, who, feeling besieged by the assault of e-mail, voice mail, pages, etc., may simply inactivate some communication devices at different times. Message senders, therefore, are faced with the choice of risking non-delivery

5    of their messages, or painstakingly re-transmitting a message on every possible mode of communication modality.

It may also be difficult to transmit the same message to multiple recipients. While a single e-mail message, sent once, can reach an unlimited number of destinations, phone messages must be repeated for each call.

10   Moreover, different recipients may have access to different types of communication channels; perhaps some recipients can be reached efficiently only by e-mail, others by fax, and still others by page.

The integration of communication input devices also raises the prospect of messages having multiple forms of content. Today, a single

15   message may include input from a variety of sources (e.g., voice and text); transmitting such a message by traditional means may be quite cumbersome, involving multiple separate transmissions that must be coordinated or difficult "packaging" of the different inputs into a single message.

# DESCRIPTION OF THE INVENTION

## Brief Summary of the Invention

The present invention facilitates transmission of messages composed on one or more input devices to a single or multiple recipients by means of

5      one or plural communication modalities.  Such communication modalities may include, for example, conventional or wireless telephone, facsimile transmission, pager, e-mail, postal mail or courier.  Thus, a message may be directed to a single recipient via multiple modalities, such as e-mail and fax, in order to ensure the earliest possible receipt of the message; or a may be

10     directed to multiple recipients by a single modality or by different modalities (e.g., some recipients receive the message by e-mail, others by fax, others by phone).  The invention may be configured to respond to defined "escalation" rules that specify conditions under which different delivery modalities may be sequentially employed.  For example, the rules may

15     specify that if there is no response to an e-mailed question within an hour, the recipient is to be telephoned.  Moreover, in addition to alternative transmission modalities, the escalation rules may specify alternative recipients (as well as alternative modalities for those recipients).  The escalation rules may also specify default contact methods, which may apply

20     to specific individuals or to lists of recipients.

The invention may include functionality for determining whether a message has been received (e.g., telephone and e-mail polling), as well as automatic sender notification upon confirmation of receipt. Moreover, in addition to monitoring messages in order to confirm their receipt, the invention may facilitate recipients' responses. In this way, the invention can orchestrate multi-question surveys utilizing multiple communication modes; for example, individuals contacted directly can respond immediately, while others can respond later in accordance with instructions delivered to them— e.g., via a web site or by calling a toll-free number.

In addition, the invention supports messages having embedded questions that call for response by the recipient. Such responses, when received, may be communicated to the message sender and/or accumulated.

The invention may also facilitate scheduling of message delivery, on a mode-by-mode basis where appropriate. Scheduling may include delivery at a particular time or within a designated time window, or may involve preventing delivery during specified "black-out" periods. In some embodiments, scheduling may be automatic and based on considerations such as the recipient's time zone and the form of communication (e.g., to avoid awakening the recipient by telephone).

## Brief Description of the Drawings

The foregoing discussion will be understood more readily from the following detailed description of the invention, when taken in conjunction with the accompanying drawings, in which:

5      FIG. 1 schematically represents the basic approach of the invention;

FIG. 2A is a flow diagram illustrating the basic messaging functions of the invention;

FIG. 2B is an illustrative web page showing selection of contacts and distribution lists;

10     FIG. 2C is an illustrative web page for receiving media selections; and

FIG. 2D is an illustrative web page showing tabulated receipt statuses and responses to an embedded question.

## Detailed Description of the Preferred Embodiments

15     The Internet, which can provide the communication medium of the present invention, is a worldwide "network of networks" that links millions of computers through tens of thousands of separate (but intercommunicating) networks.  Via the Internet, users can access

tremendous amounts of stored information and establish communication linkages to other Internet-based computers.

Much of the Internet is based on the *client-server* model of information exchange. This computer architecture, developed specifically to

5   accommodate the "distributed computing" environment that characterizes the Internet and its component networks, contemplates a server (sometimes called the host) that services the requests of a large number of smaller computers, or clients, which connect to it. A server is typically a powerful workstation or mainframe computer, while the clients may be simple personal

10  computers. Servers providing Internet access to multiple subscriber clients are referred to as "gateways"; more generally, a gateway is a computer system that connects two computer networks.

In order to ensure proper routing of messages between the server and the intended client, the messages are first broken up into data packets, each

15  of which receives a destination address according to a consistent protocol, and which are reassembled upon receipt by the target computer. A commonly accepted set of protocols for this purpose are the Internet Protocol, or IP, which dictates routing information; and the transmission control protocol, or TCP, according to which messages are actually broken

20  up into IP packets for transmission for subsequent collection and reassembly. TCP/IP connections are quite commonly employed to move data across telephone lines.

The Internet supports a large variety of information-transfer protocols. The World Wide Web (hereafter simply the "web") represents one of these. Web-accessible information is identified by a uniform resource locator or "URL," which specifies the location of the file in terms of a specific

5    computer and a location on that computer.  Any Internet "node" — that is, a computer with an IP address (e.g., a server permanently and continuously connected to the Internet, or a client that has connected to a server and received a temporary IP address) — can access the file by invoking the proper communication protocol and specifying the URL.  Typically, a URL has the

10   format *http://<host>/<path>*, where "http" refers to the HyperText Transfer Protocol, "host" is the server's Internet identifier, and the "path" specifies the location of the file within the server.  Each "web site" can make available one or more web "pages" or documents, which are formatted, tree-structured repositories of information, such as text, images,

15   sounds and animations.

An important feature of the web is the ability to connect one document to many other documents using "hypertext" links.  A link appears unobtrusively as an underlined portion of text in a document; when the viewer of this document moves his cursor over the underlined text and

20   clicks, the link — which is otherwise invisible to the viewer — is executed and the linked document retrieved.  A link may also be associated with a two-dimensional bounded region of a document.

Hypertext and searching functionality on the web is typically

implemented on the client machine via a web browser.  As shown in FIG. 1,

a client system 110, belonging to (or operated by) a message sender or

recipient, is implemented as a personal computer having a network interface

5    112 and, running on the system as an active process, a web browser 115.

Network interface 112 connects, generally via telephone dial-up, to a

gateway or other Internet access provider.  As a result, the client machine

110 becomes a node on the Internet, capable of exchanging data with other

Internet computers.  (Naturally, computer 110 also contains various

10   conventional components, i.e., system storage, an operating system and a

graphical user interface, and a keyboard and/or position-sensing device (e.g.,

a mouse) for accepting input from the customer.  For simplicity of

presentation, these are not shown.)  Browser 115 controls the content

presented on a display 117.  With the client connected as an Internet node,

15   the browser utilizes URLs— provided either by the customer or a link— to

locate, fetch and display the specified documents.  "Display" in this sense

can range from simple pictorial and textual rendering to real-time playing of

audio and/or video segments or alarms, mechanical indications, printing, or

storage of data for subsequent display.

20        By means of the URL, browser-originated messages reach a server

system 125 (which implements the functions of the invention as described

below) via the Internet.  The browser passes the URL to a protocol handler

on server 125, which retrieves and transmits to the client machine 110

rendering instructions defining the requested web page. The browser causes

the received information to be cached (usually on a hard disk) on the client

computer. A web page may be written in HyperText Markup Language, or

5    HTML, which breaks the document into syntactic portions (such as headings,

paragraphs, lists, etc.) that specify layout and contents; and/or in a scripting

language such as Java.

Suppose, for example, that the client user instructs the client-resident

browser 115 to obtain a document having the URL *http://host/file.html*. The

10    browser contacts the HTTP server running on "host," and requests the

document *file.html*. The server finds this document and sends it according

to the proper Internet protocol, along with a Multipurpose Internet Mail

Extension or "MIME" identifier that specifies the document's type. When

client 110 receives the document, browser 115 examines the MIME to

15    determine whether it is capable of autonomously displaying the document, or

whether an external resource (e.g., a specialized viewer to display video

segments) is necessary. In a simple case, the document might contain text

and graphics specified in HTML, and specify an image residing in a different

file on a different server or on the same server. The browser 115 renders

20    the document in accordance with the HTML instructions and requests the

image, displaying it in the document as specified by the instructions when

the image arrives.

Server system 125, which is illustrated in greater detail, may be implemented as a single workstation or as a network of server computers, depending on the activity level and included functionality. For explanatory purposes, server 125 is represented as a single machine that includes a

5   network interface 127 continuously connected to the Internet. Network interface 127 and the other internal components of server 125 intercommunicate over a main bidirectional bus 130 (which may be a physical bus in a single hardware device, or can instead represent a network such as a LAN or a WAN). The main sequence of instructions effectuating

10   the functions of the invention and facilitating interaction among clients, server 125, the Internet, and other modes of communication reside on a mass storage device (such as a hard disk or optical storage unit) 132 as well as in a main system memory 134 during operation. Execution of these instructions and effectuation of the functions of the invention is

15   accomplished by a central-processing unit ("CPU") 136.

A group of functional modules that control the operation of CPU 136 and effectuate the operations of the invention is shown conceptually as located in system memory 134; once again, however, it should be stressed that this organization is for explanatory purposes. The various modules and

20   servers may indeed be realized as active processes running on a single machine, but functionality may instead be distributed among multiple

machines (or processors within a single machine), once again depending on the activity level and included capabilities.

An operating system 140 directs the execution of low-level, basic system functions such as memory allocation, file management, and operation

5    of mass storage devices 132. At a higher level, a control block 142, implemented as a series of stored instructions, manages interaction among the various functional components of the server and ensures proper routing of data thereamong.

Server 125 is capable of communicating with customers in various

10    modes, primarily by means of the web and electronic mail. Accordingly, a web and e-mail (hereafter "web/mail") server block 145 receives communications from customers via the web and/or e-mail, and transmits proper responses via a network interface 147. All interactions with the customer take place via web/mail server 145 or, in the case of telephone

15    communication, via a telephony server 147; of course, customer interaction using other media or formats is possible (e.g., programmatic interfaces for direct connection to third-party applications), and would be handled by an appropriate server. The pattern of interaction with the customer, the content of transmissions to the customer's computer, and functionality associated

20    with the customer's address book are handled by a transaction server 150. Transaction server 150 has access to various databases, collectively indicated at 152; these databases, discussed in greater detail below, are

ordinarily stored on devices 132 and accessed as necessary. Depending on the customer's requests and interaction with server 125 via browser 115, transaction server 150 selects or causes assembly of various web pages collectively indicated at 155, and causes web/mail server 145 to serve the

5    pages to the client 110 via network interface 127. During an initial interaction with a customer, transaction server 150 obtains payment and identification information, which is stored in the customer's record on a database 152. Credit-card validation and billing for services performed by the invention is handled by a billing server 160.

10   The various functions performed by the invention, which result in different patterns of interaction with customers, will now be described.

*1. Media Conversion and Basic Message Transmission*

Web/mail server 145 and telephony server 147, as well as any other media servers, represent the interface servers that provide connecting points

15   for customers. Customer requests are passed from an interface server to transaction server 150, which guides the message-composition process via the interface server(s) (i.e., transaction server 150 returns information to the interface servers, instructing them as to the proper questions to ask the customer). Once the customer has issued sufficient commands and provided

20   sufficient content to fully specify a message (i.e., the message body, the recipient(s), desired delivery methods, and message options such as delivery

scheduling and/or escalation rules), a message "job" is created and stored in a database 152. The job is passed to a job queue server 165, which is responsible for implementing and scheduling all message jobs.

At this point, the message remains in the format in which it was composed. As noted previously, however, the invention is capable of receiving messages, via the interface servers, in one format and transmitting them in a different, customer-selected format. The functions of media conversion and message assembly are performed by a series of message delivery servers, collectively illustrated at 167, dedicated thereto. The appropriate message delivery server 167 converts messages to the specified format and causes their transmission, via the designated communication medium, by means of a corresponding device driver selected from among a suite of drivers. The drivers operate a series of transmission devices, which include network interface 127 for e-mail and/or web-based message delivery; a telephone interface 170 for message transmission by telephone, facsimile, pager, or handheld wireless device (although it should be noted that pager and wireless transmission can occur through network interface 127); and a document-generation module 172 for message transmission by postal mail or overnight courier.

The timing of message transmission is governed by job queue server 165. In response to the customer's authorization to send a message, job queue server 150 triggres the conversion and transmission operations just

discussed. Job queue server 165 also contains (or, as shown for illustrative purposes, communicates with) a scheduling module 180, which can orchestrate transmission of messages at customer-specified times based on the computer's internal clock.

5      The basic operation of these components is set forth in FIG. 2A. In a first step 200, the customer and the desired recipients are identified. Each customer is represented in a customer database 152a. Associated with each customer record is an "address book," i.e., a list of contacts (i.e., potential recipients) from which the customer may select. Alternatively, the customer

10     may enter data for a new contact not yet in the address book, in which case the contact is added prior to transmission of the message. Accordingly, the entries in a customer's address book may accumulate passively, as messages are sent; or may be organized and updated by the customer independent of actual message transmission.

15     Preferably, database 152b allows address books to be organized into distribution lists, as shown in FIG. 2B. In this way, customers are afforded the opportunity to group contacts into categories meaningful for purposes of message routing. For example, in FIG. 2B, the illustrated distribution lists include a team responsible for a particular account, headquarters, and various

20     regions. These categories, defined by the customer, collect contacts likely to receive similar messages. Selection of one of the distribution lists results in individually selectable display of the contacts within that list, and the

customer may indicate all or a subset of those contacts as recipients of a message.

A recipient's data record may include data for the following fields: name; telephone number (home and work, which can be tried sequentially); cellular phone number; facsimile number; postal address; e-mail address; pager number; links to one or more distribution lists; delivery restrictions (e.g., "blackout" periods during which the recipient will not wish to receive telephone calls, or allowed time windows for message transmission by specified modalities); escalation rules (described below); records of messages sent and receipt status; a category field, i.e., a label that facilitates grouping of contacts for purposes of searching and distribution; and company/job title information. Thus, customers may search their address books or distribution lists (or organize distribution lists) in various ways. Most directly, transaction server 150 will have database-search capability allowing customers to sort contacts by category field and search within a selected field. A field may group contacts geographically (such as "headquarters" or "eastern region") or in any other way meaningful to the customer. Moreover, a contact field can itself be further broken down into subfields, e.g., by communication modality or other criteria. Each contact field or subfield can itself represent a distribution list (so that, for example, a customer may direct e-mail to those contacts within the eastern region sublist who have e-mail capability).

In step 205, a message is received from a customer, typically by means of a web page 155, and in step 210, the customer indicates the medium (or media) by means of which the message is to be transmitted. These steps are ordinarily accomplished through the use of web pages 155

5    that are configured to receive message text and to respond to selection of radio buttons or other indicia in order to determine the customer's selections. The text and selections are processed by transaction server 150, e.g., by means of a script running as an active process therein. As noted above, each customer receives a record in a customer database, which may also

10    include an address list of frequent message recipients (along with data that facilitates routing of messages to these individuals).

A representative web page for receiving media selections is illustrated in FIG. 2C. Using a mouse or other position-sensing device, the customer clicks to place check marks next to the media by which the message will be

15    sent. The message may be sent via all indicated media, or, as discussed in greater detail below, in accordance with customer-defined "escalation rules" specifying the use of different media only as necessary to achieve a single successful delivery of the message.

In step 220, the format of a received message— typically plain text, if

20    received via a web page— is converted into the format appropriate to each designated transmission medium. For example, in the case of a message to be delivered by e-mail, the text is combined with header information

specifying the recipient's electronic address; in the case of facsimile

transmission, the text is copied into a cover-page document (e.g., by means

of a word-processing application resident on server block 165); and in the

case of a letter to be delivered by postal mail or courier, the text is copied

5    into a message or letter format and an envelope or courier pouch prepared.

Plain text may also be transmitted to handheld wireless devices (such as so-

called "personal digital assistants" or wireless telephones with text-reception

capability) by means of telephone interface 170.

More complex modes of processing are also possible.  Server block

10    165 may contain a text-to-speech conversion module, enabling customer-

provided text to be transmitted by voice to the recipient by means of

telephone interface 170.  Conversely, and with renewed reference to FIG. 1,

telephony server 175 may be configured to respond to spoken customer

commands, allowing the customer to compose and address a message by

15    telephone (i.e., by communicating with server 125 by means of telephone

interface 170).  For example, through interaction with transaction server

150, the customer may select delivery of a voice message by telephone.  To

facilitate the customer's communication of the voice message to server 125,

telephone interface 170 may be accessed by means of a toll-free number and

20    an access code provided to the customer, via the web, upon selection of the

voice-message option.  When the customer calls the toll-free number, a

messaging system prompts the customer to key in the access code, which

causes telephony server to record the message and associate it with the customer's database record for transmission to the designated recipient(s) (and for subsequent billing).

In still more complex operational modes, the invention may facilitate
5    catenation of message— either as separate segments of the same format, or as segments encoded in different formats. In the case of audio messages, for example, a message delivery server 167 may append an audio "header" (typically a so-called "professional prompt") and a "trailer" to the customer's message. Thus, when the recipient answers the telephone, the header
10    portion of the message may tell him that he is about to receive a message from the customer, and the trailer portion may facilitate response (as explained in further detail below).

Message segments having different formats may be composed from a variety of input devices, or may originate as a single composite message with
15    multiple components. For explanatory purposes, consider a simple composite message that includes an audio segment (e.g., a recorded message) and an image. The composite message may be received by server 125 from the customer as a single e-mail with two attachments (a .wav audio file and a .jpg image file) or as two separate e-mails; in either case, a single modality—
20    electronic mail— is employed to deliver both components. Alternatively, the image component may be sent to server 125 by e-mail or by fax, and the audio portion recorded directly by the customer via telephone. (Once again,

server 125 may automatically append a header and/or trailer to the audio portion.)

In the former case, transaction server 150 associates e-mails containing components relating to the same eventual message, while job

5 queue server 165 examines the e-mail messages to determine the formats of the different components. Depending on the customer's transmission selections, the different components may simply be attached to an e-mail message as separate files and transmitted to the recipient, or may instead be sent separately by different modalities. For example, suppose the audio

10 component is an alert to police agencies concerning an escaped convict, and the image component is the convict's picture. Given the urgency of the situation, the message sender may wish to have the audio component transmitted by telephone to all commander-level personnel at municipal and state police departments within a defined region, and the image component

15 sent to these departments by e-mail and also be fax. Assuming the message sender has organized a distribution list of commander-level personnel, the message sender simply checks those individuals he wishes to reach; alternatively, the commander-level list may be further broken down into sublists covering particular regions, in which case the message sender would

20 merely select the region or regions of interest. The audio and video components are transmitted to the selected personnel as separate messages via the desired modalities.

It should be understood that the foregoing example highlights only two

possible message formats. In fact, a single message can contain

components representing any combination of formats (audio, graphics, video,

image or other bitmap, text) received from the customer by means of

5    multiple input devices (telephone, web transfer, e-mail, fax). The different

formats can be collapsed into a single message (e.g., an image and text can

be transmitted by fax), or can be transmitted by diverse modalities best

suited to the formats.

In step 225, the driver (or drivers) appropriate to the selected form (or

10    forms) of transmission is selected by a message delivery server 165. At this

point the customer may be given a schedule of charges for delivery of the

message according to the selected mode or mode of transmission, and given

the opportunity to abort message transmission. If the customer decides to

proceed, job queue server 165 causes each appropriate driver to activate an

15    associated communication device (step 230) to communicate the message to

the recipient. As described in greater detail below, server 125 may confirm

that the recipient has in fact received the message (step 235), and

communicate this information to the customer via a designated

communication device (or devices).

20        *2. Confirming Message Receipt*

Any of a variety of techniques can be used to assess whether and when a message is received. Many e-mail systems natively support receipt confirmation. Alternatively, a URL can be embedded in the message; when the recipient receives the e-mail and clicks on this URL, receipt is

5   automatically recorded. Moreover, the web page may contain questions inviting response by the recipient, who thereupon transmits the web page back to server 125 (in particular, to web/mail server block 145).

Hard-copy deliveries can be tracked through the courier or by means of a follow-up telephone call to the recipient, while for telephone messages, the

10  recipient can be asked to press a number to confirm receipt. In the context of telephone messages, it may be useful to detect whether a person or an answering machine has answered the phone. This determination can be used, for example, to select a proper audio header or even to choose between alternative messages, which may differ depending whether the

15  message is delivered to the recipient or a recording device; an answering machine, obviously, would not be asked to press a number to confirm receipt, nor would delivery typically be confirmed to the sender if the message was left on an answering machine. To implement answer detection, telephony server 147 is programmed to monitor the level of noise

20  on the line once a connection is established, distinguishing between a "silence" noise level and a "speech" level. If an individual answers, he or she will typically issue a short greeting; that is, the signal pattern of a human

answer is a short speech signal followed by silence. An answering machine, by contrast, will generally issue a long greeting ("Hello, you have reached the Smiths ..."). Based on the observed lengths of a sustained speech signal and an ensuing silence, telephony server 147 forms an initial guess as to

5    whether a person or a machine has answered. If a person is guessed, telephony server 147 will play the audio header that prompts the answerer to press a touch-tone key, and if the proper touch-tone pulse is not detected, server 147 may revise its guess and assume that it is communicating with an answering machine.

10    The customer may be notified of successful message receipt in any of numerous ways. In the most easily implemented approach, e-mail is sent to the customer when the entire job is complete. The invention may, however, support other capabilities. If the message is urgent, for example, the customer may request immediate notification of successful delivery by a

15    selected modality (telephone, pager, fax, etc.). In this case, when transaction server 150 records receipt of the message, it prepares a confirmation and sends it to the customer, via job queue server 165 and message delivery servers 167, according to the customer's media selection(s). Alternatively, the delivery may simply be recorded in the

20    customer's database record, and the customer accorded access to the information via a web page 155 (that is, the customer sees a standardized delivery-status web page showing data drawn from the delivery field(s) of

the customer's data record).  Because it is a simple matter to update the

customer's data record immediately upon successful message receipt, the

status shown in the accessed web page may be quite current.

If the customer has requested delivery to numerous individuals by

5    various media, these may be grouped and presented as shown in FIG. 2D.

Once again, although the format of the web page is standardized, it appears

as a customer-specific page because of the message-specific information.

This information is drawn, once again, from the fields of the customer's

database record relating to the message and from the record created by

10   transaction server 150 when the message was initially submitted.

### 3. Conducting Surveys

FIG. 2D also illustrates the manner in which the invention can conduct

a question-based survey, with the recipients' responses logged into a survey

database 152c (see FIG. 2C) set up for this purpose.  The customer can

15   consult database 152c to view the status of the survey, with results

tabulated (anonymously or with responder identification) by answer.  As

shown in FIG. 2D, a single question can be transmitted to numerous

recipients by multiple modes, with responses presented in tabular form as

they are received.  Telephone recipients may be asked to respond by pressing

20   a touch-tone keys corresponding to the desired response.  Alternatively,

telephony server 147 may be equipped with speech-recognition capability to

record (and interpret) spoken answers. For e-mail recipients, the message may include a URL to a web page which, as discussed above, contains the question and a facility for recording the recipient's response, which is transmitted to web/mail server block 145. Fax and pager recipients may

5    simply be asked to call a toll-free number, which can feature an automated response system. (If, for example, customers are restricted to "yes/no" questions, the automated response system can execute a single, unvarying call-flow routine that asks the answerer to press one touch-tone key to signify "yes" and another to signify "no.") If a recipient is not immediately

10   reached — e.g., a telephone answering machine receives the message — information facilitating subsequent response may be appended to the message. Thus, in the case of telephone messages, detection of an answering machine may cause telephony server 147 to add a trailer to the message instructing the recipient to call a toll-free number to provide a

15   response.

Multiple-question surveys are, of course, equally possible, as are questions involving more than two possible answers. These are handled simply by according the recipient more response options.

*4. Message Scheduling*

20   It may not be appropriate to transmit messages by certain modes during particular time periods at the recipient's location. These "blackout"

time periods may be established automatically by the invention, or may be designated by the customer or the recipient. In the case of customer designation, the customer may indicate blackout time periods for a particular message, or may permanently designate such periods for particular contacts

5    (and particular communication modalities). Most commonly, permanently designated blackout periods are used to prevent messages from being sent by telephone or pager during times when the recipient is generally likely to be asleep or away from the communication modality. Message-specific blackout periods may be utilized by message senders familiar with the

10   recipient's immediate schedule, or who do not wish to permanently establish blackout periods.

Conversely, the customer may specify particular allowed time windows within which a message must be delivered. Once again, these may be established permanently for particular contacts or "on the fly" for specific

15   messages. Moreover, customers who are also potential message recipients can block messages in fax and phone modes during specified times by making appropriate "blackout" entries in his data record; such entries also operate to restrict the times during which a message may transmitted. Thus, before allowing a message to be transmitted, transaction server checks for

20   recipient restrictions specified in the message sender's data record as well as in the recipient's data record, if one exists.

Permanent blackout times or message windows for particular contacts are defined through the customer's interaction with transaction server 150, when the customer enters the information that will be stored in the contact's record in database 152b. For example, upon entering a telephone number for

5    telephone contact, the customer may also specify a telephone blackout period and/or allowed time window, which are stored along with the telephone number in the contact record. The contact's local address information allows transaction server 150 to establish a time zone for the contact, which may also be stored in the record.

10    During message creation, the web page 155 may offer the customer the option to schedule message delivery. Upon selection of this option, the customer is allowed to define a time window — i.e., a time and date when message delivery will first be attempted, and when delivery should be completed. The customer may be queried whether it is more important to

15    finish by the specified completion time or to start transmission by the specified start time. Based on these criteria, scheduler 180 queues the message for transmission, and transaction server 150 monitors its progress. Alternatively or in addition, the customer may be allowed to specify blackout periods during which message transmission will not be attempted. This time

20    may be expressed as the local time of the recipient, in which case scheduler 180 determines the recipient's time zone from the address in his data record and schedules delivery accordingly.

Time-zone scheduling may be employed automatically.  For example, if the customer authorizes immediate message delivery at a time that would be late at night where the recipient is located, or schedules message delivery for such a time, transaction server may cause the customer to be prompted with

5    this information and asked to confirm or reschedule delivery.

### 5. Escalation

Rather than send a message to a prospective recipient redundantly via multiple communication modalities, transaction server 150 may be configured to allow the customer to specify escalation rules for sequential

10   transmission as necessary.  The customer selects a plurality of communication modalities and/or contacts, and criteria in the form of rules governing their use.  Typically, an escalation rule will specify resort to a different communication modality (or a different recipient) if delivery of the message is not confirmed by a specified time, or within a specified period,

15   using the current communication modality.

Like scheduling restrictions, escalation rules may be defined permanently for a contact (and stored in database 152*b*) or may instead be defined for a particular message.  Permanent escalation rules are once again specified through the customer's interaction with transaction server 150,

20   when the customer enters the information that will be stored in the contacts' database records.  For example, upon entering information facilitating contact

by more than one communication modality, the customer may be prompted to rank the modalities in order of preference, then to specify escalation rules linking sequentially ranked modalities. In the case of telephone delivery, for example, such a rule may take the form of "Proceed to facsimile

5    transmission if no answer within <x> minutes." If the customer selects the rule (he is of course free to decline to do so), the customer is prompted to specify a value for x. This process may continue for the various ranked modalities. The selected rules are then stored in the contact's database record, and when the customer next enters a message destined for that

10   contact, the escalation rules may be applied automatically. The modality indicated in the record as most preferred will be employed by default if the customer specifies no modality for message delivery; if the customer specifies a modality somewhere within the rankings, the escalation rules will be sequentially applied from that point forward through the hierarchy.

15   Default message modalities and permanent escalation rules are particularly useful in the context of distribution lists, since the customer can simply enter a message and leave it to server 125 to deliver it to every person on a selected distribution list in accordance with each contact's escalation rules. On the other hand, the customer may also be given the

20   opportunity to select message-specific escalation rules during message creation; this option is provided when the customer specifies more than one communication modality for a message, and is useful where no escalation

rules have previously been defined or to override defined escalation rules in particular instances.

To implement the escalation rules, the time period specified in a rule relevant to the initial message transmission is sent to scheduler 180. At the end of that time period following transmission, transaction server 150 determines whether the message has been received in the manner described above. If not, the escalation rule (defined in database 152*b* or in the transaction record for the particular message) is executed, and the message re-transmitted by a different modality. If further escalation rules remain for the message, the appropriate time period is once again provided to scheduler 180, and the flow sequence repeated.

It will therefore be seen that the foregoing represents a full-featured messaging system capable of operating in multiple communication modes and handling multiple message formats, all in accordance with variety types of customer-specified message criteria. The terms and expressions employed herein are used as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

What is claimed is: